ESTIMATING THE RATE OF RETURN OF EDUCATION IN THE INFORMAL SECTOR OF GHANA

An Undergraduate Research Scholars Thesis

by

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Submitted to Honors and Undergraduate Research
Texas A&M University
In partial fulfillment of the requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by
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May 2014

Major: Economics

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ABSTRACT

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This research aims to investigate the rate of return of education at different educational levels in order to prove that obtaining a basic education is beneficial for employment in the formal and informal sector. The informal sector is an unregulated market sector comprised of heterogeneous activities such as trading and other self-employed activities in the labor market. This study uses 2005 data from Ghana, collected by the Centre for the study of African Economies (CSAE). We use the Mincer wage equation and the Instrumental Variable (IV) approach to find whether education does matter for workers in the informal sector. We found positive returns at all levels of education in both sectors. However, there were no returns to obtaining a primary education in the formal sector. The results of our findings suggest that education does matter for informal sector workers because compared to an illiterate worker, there is an 11.6% higher return associated with obtaining a basic education in the informal sector.

ACKNOWLEDGEMENTS

I would like to acknowledge the Centre for the Study of African Economies at the University of Oxford for providing the data used in this study. I also would like to recognize the Economic and Social Research Council (ESRC) and the Department for International Development (DFID) of the UK government for providing the funding which made the survey possible. Last but not least, I would like to thank the numerous individuals who assisted in designing the questionnaires and carrying out the surveys, this research would not be made possible without their efforts and contributions.

CHAPTER I

INTRODUCTION

In the past, the literature on the returns to schooling focused on the formal sector, rather than the informal sector which is characterized by unregulated activities in the labor market. The informal sector is comprised of one of the fastest growing markets in developing countries, especially in Sub-Sahara Africa where over ninety percent of new jobs are created in the informal sector or the underground economy. Looking at the returns of education in the context of the informal sector will provide a broader understanding of how markets operate in developing countries. It will also answer the question of whether the returns to obtaining an education will differ in both labor market sectors. Finally, it shall address the concern of whether or not it is worth pursuing an education for an informal sector worker in Africa.

Estimating the returns to schooling in the informal sector is important due to the rapid rise of employment in this market sector in recent years. Past studies on the returns to schooling focused on the formal sector as it was presumed that informal sector participants had low returns to education due to low educational levels. The latest studies on this topic have sort to differentiate themselves from their predecessor by focusing on both the formal and informal sector in various labor markets around the world. Most of these studies have made use of the Mincer wage equation to examine the market wages in relations to education and experience (Mincer, 1974).

Others have conducted further analysis by implementing other methodologies such as the Instrumental Variable (IV) technique, ORU wage equation, and the Quantile regression method.

Many researchers have analyzed the rate of return of education and found positive returns in all levels of education. However, these returns often vary between educational levels and labor market sectors. For example, the positive returns from obtaining a primary education are lower than having a secondary education (Pierre, 2009). Other studies in this literature have found no returns to primary education. They found positive returns in the informal sector only after the acquisition of a secondary education. In the formal sector, positive yields to education were only obtained from the second level of secondary education (Vencatechellum, 2006).

A study on Colombia has taken a different approach by focusing on the education-occupation mismatch with regards to wage (Paula Herrera, 2013). They found that informal workers faced more penalties due to educational mismatch as opposed to their formal counterparts. Therefore, they concluded that formal workers are paid more on average than workers in the informal sector.

This research mainly investigates the returns of education at different educational levels in order to determine whether a basic education is beneficial for employment in the informal sector.

CHAPTER II

METHOD

Data

This data was acquired through the CSAE (Centre for the study of African Economies), an economic research center at the University of Oxford. This research center surveys African countries and provide substantial data to researchers. In this study, secondary data on Ghana's household survey are used. This survey includes information on urban areas, incomes, education and labor market experience, employment, household characteristics, as well as other socio-economic factors. The sample size representing Ghana's population in this survey is about two-thousand individuals.

Variables

Dependent Variable(s): The dependent variable is the natural log of wage (lnwage). The natural log of wage is used to express the results in percent. Two types of wages are expressed in this data. These include self-employed wages and wages for salaried workers.

Independent Variable(s): The independent variable in this dataset is the highest level of education completed.

Controlled Variable(s): In order to estimate the effect of education on wages, we control for the following dummy variables: years of potential labor market experience and experience-squared (experiencesq). Experience is squared because of its diminishing marginal effect overtime.

Error term(s): The remaining non-added variables that might affect the dependent variable wage are classified under an error term. These are often known as unobserved variables. These error terms include uncontrolled variables such as ability, skills, disabilities, availability of jobs, etc. Ability and skills are important unobserved variables that play important roles in determining labor market outcomes. For example, an able individual might obtain more schooling and earn more because of his or her ability, rather than an additional schooling. Education as a signal for ability suggests that the returns to education is biased upward, and therefore overestimated.

Methods

This research examines whether the returns to obtaining the same level of education differ between the formal and informal sector. It mainly tries to test whether an education matter for workers in the informal sector. To determine this, an ordinary least squared regression (OLS) is designed to regress log of wage on education.

Our equations to be estimated are as follow:

OLS/Mincer wage equation:

$Lnwage = \beta_0 + \beta_1 education + u_i$

$Lnwage = \beta_0 + \beta_1 education + \beta_2 experience + \beta_1 experiencesq + u_i$

The simple regression above measures the effect of years of education completed on the log of wage. The second regression represents the Mincer wage equation which is used to calculate the rate of returns of education.

Instrumental Variable (IV) & 2SLS

General equation for IV:

$y_1 = \beta_0 + \beta_1 y_2 + \beta_2 z_1 + \ldots \beta_k z_k + u$

$y_2 = \pi_0 + \pi_1 z_{k+1} + \pi_2 z_1 + \ldots \pi_k z_k + v$

Omitted variable is the major source of endogeneity. Self-selection can also introduce bias in the sample because the individuals that responded to the survey chose to respond. The Instrumental variable regression is used to solve this endogeneity problem caused as a result of important missing variables and self-selection. This study uses the distance to primary and secondary school as instruments to evaluate its effect on future wages. These might be good instruments since they are correlated to wage only through education.

Nearprimary: 1 if distance is close to primary school (20 minutes or less)
0 if distance is farther (more than 20 minutes away from home)

Nearsecondary: 1 if distance from home to secondary school is close
0 if distance to secondary school is farther

Instruments: Nearprimary and Nearsecondary

Endogenous Variable: Highest level of education (Education)

Dependent Variable: Log of wage (Lnwage)

Independent Variable: Years of potential labor market experience and its squared term (Experience & Experiencesq)

CHAPTER III

RESULTS

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnwage	2350	7.565486	6.094464	0	27.63102
education	2350	8.866383	3.960966	0	21
experience	2350	18.78085	11.87185	0	59
experiencesq	2350	463.6013	541.3463	0	3481
gender	2339	0.5297136	0.4992231	0	1
age	2350	33.64723	11.54713	15	71
agesq	2350	1265.416	855.1913	225	5041
nearprimary	2326	0.816423	0.3872221	0	1
nearsecondary	2080	0.2668269	0.4424075	0	1
selfemployed	2336	0.3604452	0.4802324	0	1
wageearner	2336	0.3441781	0.4752012	0	1
unemployed	2336	0.2953767	0.4563096	0	1
in-the-labor force (inlf)	2336	0.7046233	0.4563096	0	1

Missing observations in the sample correspond to response such as « Don’t know » or omitted response. 25 missing observations were dropped due to its negative effect on some variables such as experience.

Table 1: Mincer Wage Regression

VARIABLES	(1) lnwage	(2) lnwage
education	0.150***	0.301***
	(0.0309)	(0.0290)
experience		0.586***
		(0.0323)
experiencesq		-0.00870***
		(0.000734)
Constant	6.231***	-1.816***
	(0.292)	(0.416)
Observations	2,350	2,350
R-squared	0.010	0.209

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1 is a simple linear regression that shows a 15% increase in wage as a result of an additional year of education. Though this test is statistically significant at all levels, an R-Square (coefficient of determination) of 0.010 shows that only a small percent of the variance in wage can be explained by education. This indicates that there are omitted variables that influence wage other than the years of education. Therefore, we account for the years of labor market experience in a quadratic equation. As a result, one more year of education increases wages by 30%. The significant negative coefficient for experiencesq indicates a diminishing marginal effect which means that the returns associated with labor market experience increases at a decreasing rate over time.

Table 2.1: Instrumental Variable Regression (IV)

VARIABLES	(1) education	(2) education
experience		-0.0819***
		(0.0239)
experiencesq		-0.000121
		(0.000561)
nearprimary	-0.394*	-0.270
	(0.233)	(0.223)
nearsecondary	0.178	0.152
	(0.196)	(0.191)
Constant	9.103***	10.58***
	(0.206)	(0.242)
Observations	2,079	2,079
R-squared	0.002	0.069

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The first stage of the IV regression is estimated to determine whether these instruments are relevant. The farther the distance to school, the less likely a primary school student will get more education. However, a secondary school student is more likely to obtain an additional year of education, even if the distance to school is farther. Therefore, distance to school does have an effect on schooling decisions in primary school. However in secondary school, the distance to school has a lesser effect on determining a student's decision to further his/her education.

Table 2.2: Second Stage of Instrumental Variable Regression

VARIABLES	(1) IV	(2) IV
education	-0.276	1.232
	(0.875)	(1.226)
experience		0.694***
		(0.111)
experiencesq		-0.00908***
		(0.000926)
Constant	9.991	-11.77
	(7.725)	(12.78)
Observations	2,079	2,079

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Looking at the regression above, the odd coefficients and large standard errors derived from this instrumental variable regression suggests that nearprimary (distance to primary school) and nearsecondary (distance to secondary school) are weak instruments which do not explain variation in years of schooling.

Table 3: Rates of Returns at Different Levels of Education for Informal Sector Workers

In this research, we assume self-employed workers are informal sector workers, while salaried workers are formal sector workers. This is because in this sample, self-employed workers have similar characteristics to informal sector workers. Some of these characteristics include trading and small scale business. This is the contrary for salaried employment which are often manufacturing jobs in large enterprises.

Table 3.1: Rate of Return of Primary Education for Self-Employed Workers

VARIABLES	(1) lnwage	(2) lnwage
education	1.732***	0.216***
	(0.0287)	(0.0486)
experience		0.728***
		(0.0254)
experiencesq		-0.0117***
		(0.000789)
Constant	0.598***	0.0282***
	(0.0537)	(0.00483)
Observations	2,336	2,336
R-squared	0.508	0.947

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.2: Rate of Return of Secondary Education for Self-Employed Workers

VARIABLES	(1) lnwage	(2) lnwage
education	1.141***	0.902***
	(0.0115)	(0.0628)
experience		0.244***
		(0.0602)
experiencesq		-0.00515***
		(0.00132)
Constant	0.0214***	0.0162***
	(0.00399)	(0.00356)
Observations	2,336	2,336
R-squared	0.933	0.936

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.3: Rate of Return of Tertiary Education for Self-Employed Workers

VARIABLES	(1) lnwage	(2) lnwage
education	0.815***	0.614***
	(0.0224)	(0.0608)
experience		0.300***
		(0.101)
experiencesq		-0.00524*
		(0.00268)
Constant	0.00579***	0.00351***
	(0.00161)	(0.000943)
Observations	2,336	2,336
R-squared	0.971	0.980

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The return to obtaining an additional year of primary education for a self-employed worker is 21.6%. Looking at this return in the secondary education, we see a 90.2% return. In the tertiary stage, there is 61.4% return. Again, there are positive returns at all levels of education.

Table 4: Rates of Returns at Different Levels of Education for Salaried Workers

Table 4.1: Rate of Return of Primary Education for Salaried Workers

VARIABLES	(1) lnwage	(2) lnwage
education	1.323***	-0.0456
	(0.140)	(0.139)
experience		0.467***
		(0.0552)
experiencesq		-0.00415***
		(0.00126)
Constant	0.251***	-0.00499
	(0.0366)	(0.00462)
Observations	2,336	2,336
R-squared	0.258	0.794

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The p-value of 0.74 is larger than the conventional significance level of 0.05, which means this regression is not statistically significant. An additional year of primary education might not affect wages in salaried employment. This might be related to the notion of barriers to entry in the formal sector. An individual with only a primary education is less likely to enter the formal sector.

Table 4.2: Rate of Return of Secondary Education for Salaried Workers

VARIABLES	(1) lnwage	(2) lnwage
education	1.031***	0.494***
	(0.0230)	(0.0774)
experience		0.450***
		(0.0716)
experiencesq		-0.00658***
		(0.00147)
Constant	-0.0118	-0.0182***
	(0.00719)	(0.00629)
Observations	2,336	2,336
R-squared	0.735	0.773

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.3: Rate of Return of Tertiary Education for Salaried Workers

VARIABLES	(1) lnwage	(2) lnwage
Education	0.830***	0.617***
	(0.0252)	(0.0943)
experience		0.347**
		(0.145)
experiencesq		-0.00724**
		(0.00334)
Constant	0.0144***	0.0104***
	(0.00390)	(0.00356)
Observations	2,336	2,336
R-squared	0.862	0.869

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Both the secondary and tertiary education yield positive returns and are statistically significant at all significant levels. There are greater returns associated with obtaining one more year of tertiary education as compared to a secondary education. A secondary education is most beneficial to a self-employed worker because it yields the most returns out of all the levels of education. As for salaried workers, a tertiary education yields the most returns.

Table 5: Blinder Oaxaca Decomposition: Gender Wage Gap

VARIABLES	(1) overall	(2) endowments	(3) coefficients	(4) interaction
group_1	8.406***			
	(0.191)			
group_2	6.812***			
	(0.165)			
difference	1.595***			
	(0.252)			
endowments	0.401***			
	(0.126)			
coefficients	1.166***			
	(0.238)			
interaction	0.0284			
	(0.106)			
education		0.417***	0.0339	0.00669
		(0.0752)	(0.493)	(0.0973)
experience		0.357	0.852	0.0288
		(0.284)	(1.237)	(0.0476)
experiencesq		-0.373*	-0.0805	-0.00711
		(0.206)	(0.695)	(0.0616)
Constant			0.360	
			(0.889)	
Observations	2,339	2,339	2,339	2,339

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The mean of log wages (lnwage) is 8.4 for men and 6.8 for women, which gives a wage differential of 1.59. The 0.4 increase in endowments indicates that differences in education and years of potential work experience only account for small portion of the wage gap. The « coefficients » measures the change in the wages of women when applying the men's coefficient to women's characteristics.

CHAPTER IV

CONCLUSION

This research makes use of the 2005 household survey data on Ghana, in order to determine whether an education matters for informal sector workers. The results from this study were consistent with past studies in restating the positive returns at different educational levels in the formal and informal sector. However, there were no returns to obtaining a primary education in the formal sector. We saw higher returns to obtaining a primary and secondary education in the informal sector than the formal sector. However, the returns to obtaining a tertiary education were almost the same in both sectors. We also found that the years of labor market experience contributed more to wages in the formal sector than the informal sector.

There were positive wages associated with having no education in the informal sector. However, these were lower than the returns of an informal sector worker with some sort of primary education. Compared to an illiterate worker, there was about an 11.6% higher return to obtaining a primary education in the informal sector. Therefore, getting an education does matter for workers in the informal sector.

The Ghanian government has always been in favor of educating its citizens since the country celebrated its independence in 1957. The passage of the Educatitonal Act of 1961 established a free and compulsory primary education for all students. The positive returns we obtained from

our results shows that this government subsidy had a positive influence on our representative population sample. However, the government still needs to subsidize higher education, especially the tertiary education. This is because only a small percentage of the population obtain a tertiary education. In addition, the government should create more jobs in the formal sector, since 36% of workers chose to work in the informal sector because they could not find salaried jobs in the formal sector.

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